



Encapsulation Technologies

Eliminating Airborne Contamination

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Success Stories

Rocky Flats

Encapsulation Technologies is using its patented passive airborne generator to reduce the airborne concentrations at Rocky Flats, a DOE facility near Boulder, Colorado. The pre-fogging Derived Air Concentrations (DAC) were in the 40,000-to-60,000 range (and had been as high as 267,000 before initial pre-fog decontamination efforts were completed) and the post-fogging DACs ranged from 7 to 62 DAC.

A second room was then selected for continuation of the "fogging" decontamination process. This room's pre-fog DAC was 110,000, which was reduced to 3 DAC after "fogging". The "fogged" surfaces in both rooms that were accessible to personnel during subsequent entries were coated with Insta-Cote™ to prevent transfer of "fogged" contamination onto the protective clothing and equipment of the workers.

Workers apply sweet solutions to Pu contamination

Rocky Flats Endvision

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Amazingly simple, a new technology being tested at Rocky Flats puts sugar against plutonium for a sweet victory. By applying an aerosol fog consisting of sugar, glycerin and water in a first-of-its-kind effort, contamination workers have been able to dramatically decrease airborne plutonium contamination in one of the most contaminated rooms at Rocky Flats.

"We have seen a more than ten-fold reduction in contamination; this is a tremendous breakthrough," said Dick Hogue, who heads the initiation for Safe Sites of Colorado. "The use of this new process could cut millions off the cleanup price tag for rooms, ducts and gloveboxes in our most contaminated facilities and also significantly reduce chances for worker exposure."

The technology's first test run, on Room 3559, was completed last week. Dubbed an "infinity" room because the amount of contamination was so high that it would cause hand-held radiation detection equipment to "peg out" the room contains 13 plutonium nitrate solution processing tanks and was contaminated by leaking acid from past production operations. Through the use of this new technology, contamination in the room was brought down from more than 90,000 derived air concentrations (DAC), a measure for plutonium particles in the air, to less than 100 DAC. Called Capture Coating™, the sugar fog was developed by a California company called Encapsulation Technologies. Used at other Department of Energy sites and in the private sector, the Capture Coating™ had to be modified for a unique application at Rocky Flats. Encapsulation Technologies has teamed with Master Lee Hanford Corp. to do the work.

"We'd never used the process before," said Radiological Control Technician Foreman Karen Leitner, "and we (the RCTs) had concerns that the fogging would mask the alpha contamination – more or less blinding us. The concern was we had to be able to detect it."

Seeing the Light

So RCTs working with project engineers and project management eventually came up with a unique solution. They discovered that by adding a fluorescent tracer called "Invisible Blue" to the sugar fog they could track potentially contaminated fog residues that might adhere to worker clothing and equipment. Invisible to the human eye, the tracer can be seen only by shining a black light on it.

"You could see the whole room light up," Karen said. "Instead of monitoring with just radiation detection equipment, we are also using black light so we can visually detect potential contamination."

"Now all you have to do is shine a black light and you can actually see the stuff; the room lit up like a disco," Dick remarked.

Karen added, "We are seeing results and we are encouraged by it. We are learning as we go. "I like trying new things because it is very challenging work from a radiation perspective."

The Capture Coating™ can be used in conjunction with a two-part poly-urea coating called Insta-Cote™ developed and brought to market by Master Lee Hanford Corporation and Insta-Cote™ . Together the two-step process removes the plutonium contamination from the air and then seals it in place on the floor or walls of the room. The poly-urea coating is very durable and impermeable and fire-retardant.

How it works

First the room is fogged for 30 to 40 hours using a fine aerosol created by a machine using sound waves to make the droplets very small. The fog is then pumped into the room through a flexible duct, the kind used on a gas clothes dryer. After the fog is allowed to set and dry, a 1/8 to 1/4-inch layer of the Insta-Cote™ is applied to fix the contamination in place and provide a workable surface for future cleanup workers who will have to dismantle the facility.

In the past, workers had used pressurized hot water spray to remove contamination from rooms like 3559 – a process which involved workers actually going into the contaminated area multiple times using supplied breathing air suits. The new process means a minimized amount of worker exposure and a decrease in the size of the work crew.

"The previous method required more than a dozen workers for a single entry into the room; this process requires only four people." Hogue explained.

Now that the technology has met with success, Capture Coat™ and Insta-Cote™ , either together or separately, may be used to decontaminate a range of items at Rocky Flats from Raschig ring tanks to gloveboxes, to ventilation ducts, process piping and , yes, other "infinity" rooms.

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